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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/814,258	04/01/2004	Takashi Ito	251288US2	6972

22850 7590 03/25/2008

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EXAMINER	
ZERVIGON, RUDY	

ART UNIT	PAPER NUMBER
1792	

NOTIFICATION DATE	DELIVERY MODE
03/25/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/814,258	ITO, TAKASHI	
	Examiner	Art Unit	
	Rudy Zervigon	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 December 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6,8-10,19 and 21-24* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6,8-10,19 and 21-24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. Claims 1-6, 10, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fairbairn; Kevin et al. (US 5838121 A) in view of Suzuki; Akira et al. (US 5522934 A). Fairbairn teaches a processing apparatus (Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55), comprising: a transfer chamber (104; Figure 4; column 4, lines 35-55); a plurality of processing chambers (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55) for processing therein a substrate ("wafer"; throughout) to be processed, the processing chambers (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55) being coupled to the transfer chamber (104; Figure 4; column 4, lines 35-55); a plurality of shower heads (642; Figure 19; - see common "106"; column 4, lines 35-55), installed at upper parts of the processing chambers (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55), for providing a gas to be converted into a plasma in the processing chambers (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55); a number of electrostatic chucks ("pedestal 628"; Figure 19; column 14, lines 50-55; column 12; line 15) which are provided in the processing chambers (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55), to electrostatically adsorb the substrate ("wafer"; throughout) to be processed thereto; a transfer mechanism (500; Figure 15; column 8, line 53 -

column 9, line 4) installed in the transfer chamber (104; Figure 4; column 4, lines 35-55) to transfer the substrate ("wafer"; throughout) to be processed between the processing chambers (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55) and the transfer chamber (104; Figure 4; column 4, lines 35-55); and a monatomic nitrogen (column 20, lines 12-13) atom supply unit (800; Figure 23,24; column 18, lines 18-40) for providing dissociated monatomic nitrogen (column 20, lines 12-13) atoms in the processing chambers (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55), wherein the monatomic nitrogen (column 20, lines 12-13) atoms are supplied into each processing chamber (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55) after finishing processing the substrate therein to remove charge on an electrostatic chuck ("pedestal 628"; Figure 19; column 14, lines 50-55; column 12; line 15) provided in said each processing chamber (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55) and the monotomic nitrogen atoms are dissociated before ("flow rate of *activated* species"; column 19; lines 11-20) entering said each processing chamber (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55), wherein the monatomic nitrogen (column 20, lines 12-13) atom supply unit (800; Figure 23,24; column 18, lines 18-40) includes a pipe (812; Figure 24; column 18, lines 20-25) communicating with said each processing chamber (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55), an N_2 gas supply source (804/814; Figure 24; column 18, lines 20-25) for providing an N_2 gas through the pipe (812; Figure 24; column 18, lines 20-25), and an energy supply unit (808; Figure 23,24;

column 18, lines 18-40) for applying energy to the N_2 gas in the pipe (812; Figure 24; column 18, lines 20-25) or in the processing chambers (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55) to convert the N_2 gas into the dissociated monatomic nitrogen (column 20, lines 12-13), wherein a height at which the pipe (812; Figure 24; column 18, lines 20-25) communicates with said each processing chamber (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55) is substantially equal to a height of the electrostatic chuck ("pedestal 628"; Figure 19; column 14, lines 50-55; column 12; line 15) provided in said each processing chamber (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55) atoms as claimed by claim 1. Applicant's claim requirements of "after finishing processing the substrate therein to remove charge on an electrostatic chuck" and "wherein a height at which the pipe (812; Figure 24; column 18, lines 20-25) communicates with said each processing chamber (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55) is substantially equal to a height of the electrostatic chuck ("pedestal 628"; Figure 19; column 14, lines 50-55; column 12; line 15) provided in said each processing chamber (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55)" are claim requirements of intended use in the pending apparatus claims. The claimed "height" of the electrostatic chuck is a variable in the Fairbain apparatus because it is raised and lowered (see 626, 630, 603; Figure 19). Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter , 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended

use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey,152 USPQ 235 (CCPA 1967); In re Otto , 136 USPQ 458, 459 (CCPA 1963); MPEP2111.02).

Fairbairn further teaches:

i. A processing apparatus (Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55), comprising: a transfer chamber (104; Figure 4; column 4, lines 35-55); a processing chamber (first 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55) coupled to the transfer chamber (104; Figure 4; column 4, lines 35-55), the processing chamber (first 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55) performing therein a first process on a substrate ("wafer"; throughout) to be processed; a shower head (642; Figure 19; - see common "106"; column 4, lines 35-55), installed at upper parts of the processing chamber (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55), for providing a gas to be converted into a plasma in the processing chamber (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55); a transfer mechanism (500; Figure 15; column 8, line 53 - column 9, line 4) installed in the transfer chamber (104; Figure 4; column 4, lines 35-55) for sequentially transferring the substrate ("wafer"; throughout) to be processed into the processing chamber; an electrostatic chuck ("pedestal 628"; Figure 19; column 14, lines 50-55; column 12; line 15) provided in the processing chamber (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-

55) and the monotomic nitrogen atoms are dissociated before ("flow rate of *activated* species"; column 19; lines 11-20) entering the processing chamber (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55), the electrostatic chuck ("pedestal 628"; Figure 19; column 14, lines 50-55; column 12; line 15) electrostatically adsorbing thereto the substrate ("wafer"; throughout) to be processed; and a monatomic nitrogen (column 20, lines 12-13) atom supply unit (800; Figure 23,24; column 18, lines 18-40) for providing dissociated monatomic nitrogen (column 20, lines 12-13) atoms in the first and second processing chamber (second 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55), wherein the monatomic nitrogen (column 20, lines 12-13) atoms are supplied into the processing chamber (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55) after finishing processing the substrate therein to remove charge on an electrostatic chuck ("pedestal 628"; Figure 19; column 14, lines 50-55; column 12; line 15) provided in the processing chamber (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55),wherein the monatomic nitrogen (column 20, lines 12-13) atom supply unit (800; Figure 23,24; column 18, lines 18-40) includes a pipe (812; Figure 24; column 18, lines 20-25) communicating with each processing chamber (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55), an N_2 gas supply source (804/814; Figure 24; column 18, lines 20-25) for providing an N_2 gas through the pipe (812; Figure 24; column 18, lines 20-25), and an energy supply unit (808; Figure 23,24; column 18, lines 18-40) for applying

energy to the N_2 gas in the pipe (812; Figure 24; column 18, lines 20-25) or in the processing chambers (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55) to convert the N_2 gas into the dissociated monatomic nitrogen (column 20, lines 12-13) atoms, wherein a height at which the pipe (812; Figure 24; column 18, lines 20-25) communicates with the processing chamber (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55) is substantially equal to a height of the electrostatic chuck ("pedestal 628"; Figure 19; column 14, lines 50-55; column 12; line 15) provided in the processing chamber (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55) - claim 2. Applicant's claim requirements of "after finishing processing the substrate therein to remove charge on an electrostatic chuck" and "wherein a height at which the pipe (812; Figure 24; column 18, lines 20-25) communicates with said each processing chamber (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55) is substantially equal to a height of the electrostatic chuck ("pedestal 628"; Figure 19; column 14, lines 50-55; column 12; line 15) provided in said each processing chamber (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55)" are claim requirements of intended use in the pending apparatus claims. The claimed "height" of the electrostatic chuck is a variable in the Fairbain apparatus because it is raised and lowered (see 626, 630, 603; Figure 19). Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a

claim (Walter , 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey,152 USPQ 235 (CCPA 1967); In re Otto , 136 USPQ 458, 459 (CCPA 1963); MPEP2111.02).

ii. The processing apparatus (Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55) of claim 1, wherein the monatomic nitrogen (column 20, lines 12-13) atom supply unit (800; Figure 23,24; column 18, lines 18-40) supplies the dissociated monatomic nitrogen (column 20, lines 12-13) atoms to a close proximity of the electrostatic chuck ("pedestal 628"; Figure 19; column 14, lines 50-55; column 12; line 15), as claimed by claim 3

iii. The processing apparatus (Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55) of claim 2, wherein the monatomic nitrogen (column 20, lines 12-13) atom supply unit (800; Figure 23,24; column 18, lines 18-40) supplies the dissociated monatomic nitrogen (column 20, lines 12-13) atoms to a close proximity of the electrostatic chuck ("pedestal 628"; Figure 19; column 14, lines 50-55; column 12; line 15), as claimed by claim 4

iv. The processing apparatus (Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55) of claim 2, wherein the monatomic nitrogen (column 20, lines 12-13) atom supply unit (800; Figure 23,24; column 18, lines 18-40) provides the dissociated monatomic nitrogen (column 20, lines 12-13) atoms in the transfer chamber (104; Figure 4; column

4, lines 35-55), as claimed by claim 5. Applicant's claim requirement is an intended use claim requirement. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter , 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey,152 USPQ 235 (CCPA 1967); In re Otto , 136 USPQ 458, 459 (CCPA 1963); MPEP2111.02). When the structure recited in the reference is substantially identical to that of the claims, claimed properties or functions are presumed to be inherent (In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977); MPEP 2112.01).

v. The processing apparatus (Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55) of claim 2, further comprising a controller (810; Figure 24; column 18, lines 20-25) for controlling a supply timing of the dissociated monatomic nitrogen (column 20, lines 12-13) atoms from the monatomic nitrogen (column 20, lines 12-13) atom supply unit (800; Figure 23,24; column 18, lines 18-40), as claimed by claim 6

vi. The processing apparatus (Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55) of claim 2, wherein the energy supply unit (808; Figure 23,24; column 18, lines 18-40) applies energy which is higher than the dissociation energy of the N_2 gas and lower than the ionization energy of the N_2 gas, to the N_2 gas, as claimed by claim 10

vii. A processing apparatus (Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55), comprising: a processing chamber for processing therein a substrate ("wafer";

throughout) to be processed; a shower head (642; Figure 19; - see common "106"; column 4, lines 35-55), installed at upper parts of the processing chamber (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55), for providing a gas to be converted into a plasma in the processing chamber (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55); a transfer mechanism (500; Figure 15; column 8, line 53 - column 9, line 4) for transferring the substrate to be processed into the processing chamber (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55); an electrostatic chuck ("pedestal 628"; Figure 19; column 14, lines 50-55; column 12; line 15) installed in the processing chamber (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55), for adsorbing the substrate ("wafer"; throughout) to be process thereto; and a monatomic nitrogen atom supply unit (800; Figure 23,24; column 18, lines 18-40) for providing dissociated monatomic nitrogen atoms in the processing chamber (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55) wherein the monatomic nitrogen atoms are provided in the processing chamber (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55) after finishing processing the substrate therein, wherein the monatomic nitrogen (column 20, lines 12-13) atom supply unit (800; Figure 23,24; column 18, lines 18-40) includes a pipe (812; Figure 24; column 18, lines 20-25) communicating with the processing chambers (process regions/chambers 618,620 in

common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55), an N_2 gas supply source (804/814; Figure 24; column 18, lines 20-25) for providing an N_2 gas through the pipe (812; Figure 24; column 18, lines 20-25), and an energy supply unit (808; Figure 23,24; column 18, lines 18-40) for applying energy to the N_2 gas in the pipe (812; Figure 24; column 18, lines 20-25) or in the processing chambers (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55) to convert the N_2 gas into the dissociated monatomic nitrogen (column 20, lines 12-13) atoms, - claim 19. Applicant's claim requirements of "monatomic nitrogen atoms are provided in the processing chamber after finishing processing the substrate therein" are claim requirements of intended use in the pending apparatus claims. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter , 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey,152 USPQ 235 (CCPA 1967); In re Otto , 136 USPQ 458, 459 (CCPA 1963); MPEP2111.02).

Fairbairn does not teach Fairbairn's pipe (812; Figure 24; column 18, lines 20-25) communicates with each processing chamber (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55) through a sidewall of each of said

processing chamber (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55).

Suzuki teaches a plasma processing apparatus (figures 1,2) including process gas piping (34A-C; Figure 1,2) injected through a sidewall (4; Figure 1,2) of each of said processing chamber (4; Figure 1,2).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for Fairbairn to add additional process gas injection along a sidewall of Fairbairn's chamber as taught by Suzuki.

Motivation for Fairbairn to add additional process gas injection along a sidewall of Fairbairn's chamber as taught by Suzuki is for delivering process gases uniformly as taught by Suzuki (column 6; lines 1-9).

3. Claims 8, 9, and 21-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fairbairn; Kevin et al. (US 5838121 A) and Suzuki; Akira et al. (US 5522934 A) in view of Lee; Chung J. et al. (US 6086679 A) and Rhiue; Ji H. (US 5364667 A). Fairbairn and Suzuki are discussed above.

Fairbairn further teaches a processing apparatus (Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55), which includes a processing chamber (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55) for processing a substrate ("wafer"; throughout) to be processed, a shower head (642; Figure 19; - see common "106"; column 4, lines 35-55), installed at upper parts of the processing chamber (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55), for providing a gas to be converted into a plasma in the processing

chamber (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55); and an electrostatic chuck ("pedestal 628"; Figure 19; column 14, lines 50-55; column 12; line 15), installed in the processing chamber (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55), for adsorbing the substrate ("wafer"; throughout) to be processed thereto, comprising: - claim 21

a. means for transferring the substrate ("wafer"; throughout) to be processed into the processing chamber – claim 21. Support for this portion of claim 21 is found in section [0031]. Specifically, the specification teaches "wafer transfer mechanism 6". Fairbairn teaches a wafer transfer mechanism 500. As such, Fairbairn teaches an equivalent apparatus that performs the function of transferring wafers. As a result, Fairbairn's prior art elements of 500; Figure 15; column 8, line 53 - column 9, line 4 for transferring wafers performs the identical function of transferring wafers in substantially the same way, and produces substantially the same results as the corresponding elements disclosed in the specification (MPEP 2183).

b. means for adsorbing the substrate ("wafer"; throughout) to be processed to the electrostatic chuck – claim 21. Support for this portion of claim 21 is found in section [0010]. Specifically, the specification teaches "the electrostatic chuck electrostatically adsorbing thereto the substrate to be processed". Fairbairn teaches an electrostatic chuck ("pedestal 628"; Figure 19; column 14, lines 50-55; column 12; line 15). As such, Fairbairn teaches an equivalent apparatus that performs the function of "adsorbing the substrate". As a result, Fairbairn's prior

art elements of 628 for "adsorbing the substrate" perform the identical function of "adsorbing the substrate" in substantially the same way, and produces substantially the same results as the corresponding elements disclosed in the specification (MPEP 2183).

viii. A processing apparatus (Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55), comprising: a transfer chamber (104; Figure 4; column 4, lines 35-55); one or more processing chambers (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55), each for processing therein a substrate ("wafer"; throughout) to be processed, the processing chambers (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55) being coupled to the transfer chamber (104; Figure 4; column 4, lines 35-55); a shower head (642; Figure 19; - see common "106"; column 4, lines 35-55), installed at an upper part of each processing chamber (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55), for providing a gas to be converted into a plasma in said each processing chamber (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55); a electrostatic chuck ("pedestal 628"; Figure 19; column 14, lines 50-55; column 12; line 15) which is provided in said each processing chamber (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55), to electrostatically adsorb the substrate ("wafer"; throughout) to be processed thereto; a transfer mechanism (500; Figure 15; column 8, line 53 - column 9, line 4) installed in the transfer chamber (104; Figure 4; column 4, lines

35-55) to transfer the substrate ("wafer"; throughout) to be processed between the processing chambers (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55) and the transfer chamber (104; Figure 4; column 4, lines 35-55); a monatomic nitrogen (column 20, lines 12-13) atom supply unit (800; Figure 23,24; column 18, lines 18-40) for providing dissociated monatomic nitrogen (column 20, lines 12-13) atoms in the processing chambers (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55), wherein the monatomic nitrogen (column 20, lines 12-13) atoms are provided in said each processing chamber (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55) after finishing processing the substrate ("wafer"; throughout) therein to remove charge on the electrostatic chuck ("pedestal 628"; Figure 19; column 14, lines 50-55; column 12; line 15) provided in said each processing chamber (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55); and an N2 gas supply source (804/814; Figure 24; column 18, lines 20-25) for supplying an N2 gas into said each processing chamber (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55), which communicates with the shower head (642; Figure 19; - see common "106"; column 4, lines 35-55) – claim 22. Applicant's claim requirement of "after finishing processing the substrate therein to remove charge on the electrostatic chuck provided in said each processing chamber" are claim requirements of intended use in the pending apparatus claims.

ix. The processing apparatus (Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55) of claim 22, wherein the monatomic nitrogen (column 20, lines 12-13) atom supply unit provides the dissociated monatomic nitrogen (column 20, lines 12-13) atoms in the transfer chamber (104; Figure 4; column 4, lines 35-55), as claimed by claim 23. Fairbairn's wafer transfer valves between chambers makes this possible as suggested by Applicant's own figures._When the structure recited in the reference is substantially identical to that of the claims, claimed properties or functions are presumed to be inherent (In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977); MPEP 2112.01).

x.

xi. The processing apparatus (Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55) of claim 22, wherein the controller ("system controller"; column 20; lines 45-67) further controls a supply timing of the N2 gas from the N2 gas supply source (804/814; Figure 24; column 18, lines 20-25), as claimed by claim 24

Fairbairn does not teach:

i. The processing apparatus (Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55) of claim 2, wherein the energy supply unit (808; Figure 23,24; column 18, lines 18-40) has an ultraviolet irradiation unit for irradiating ultraviolet ray to the N_2 gas, as claimed by claim 8

ii. The processing apparatus (Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55) of claim 2, wherein the pipe (812; Figure 24; column 18, lines 20-25) has a dielectric portion, and the energy supply unit (808; Figure 23,24; column 18, lines 18-40) has an

induction coil wound around the dielectric portion and a high frequency power supply for applying a high frequency to the induction coil, as claimed by claim 9

iii. means for providing dissociated monatomic nitrogen atoms in the processing chamber (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55), wherein the monatomic nitrogen atoms are provided in the processing chamber (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55) after finishing processing the substrate therein and the monotomic nitrogen atoms are dissociated before ("flow rate of *activated* species"; column 19; lines 11-20) entering the processing chamber (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55) for processing the substrate ("wafer"; throughout) therein, wherein the means for providing dissociated monatomic nitrogen (column 20, lines 12-13) atoms includes a pipe (812; Figure 24; column 18, lines 20-25) communicating with the processing chambers (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55) through a *sidewall* of the processing chamber (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55), an N_2 gas supply source (804/814; Figure 24; column 18, lines 20-25) for providing an N_2 gas through the pipe (812; Figure 24; column 18, lines 20-25), and an energy supply unit (808; Figure 23,24; column 18, lines 18-40) for applying energy to the N_2 gas in the pipe (812; Figure 24; column 18, lines 20-25) to convert the N_2 gas into the dissociated monatomic nitrogen (column 20, lines 12-13) atoms, wherein a height at which the pipe (812; Figure 24; column 18, lines

20-25) communicates with the processing chamber (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55) is substantially equal to a height of the electrostatic chuck ("pedestal 628"; Figure 19; column 14, lines 50-55; column 12; line 15) provided in the processing chamber (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55) – claim 21. Applicant's claim requirements of "after finishing processing the substrate therein to remove charge on an electrostatic chuck" and "wherein a height at which the pipe (812; Figure 24; column 18, lines 20-25) communicates with said each processing chamber (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55) is substantially equal to a height of the electrostatic chuck ("pedestal 628"; Figure 19; column 14, lines 50-55; column 12; line 15) provided in said each processing chamber (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55)" are claim requirements of intended use in the pending apparatus claims. The claimed "height" of the electrostatic chuck is a variable in the Fairbain apparatus because it is raised and lowered (see 626, 630, 603; Figure 19). Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter , 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of

performing the intended use, then it meets the claim (In re Casey,152 USPQ 235 (CCPA 1967); In re Otto , 136 USPQ 458, 459 (CCPA 1963); MPEP2111.02).

iv. wherein the monatomic nitrogen (column 20, lines 12-13) atom supply unit includes an ultraviolet irradiation unit for irradiating ultraviolet ray to the N2 gas provided in said each processing chamber (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55), a power supply for supplying a power to the ultraviolet irradiation unit, and a controller for controlling the power supply, and wherein the ultraviolet irradiation unit is provided at a sidewall of said each processing chamber (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common "106"; column 4, lines 35-55) such that the ultraviolet irradiation unit is positioned close to the electrostatic chuck ("pedestal 628"; Figure 19; column 14, lines 50-55; column 12; line 15) - claim 22.

Lee teaches energy supply units as UV (426, Figure 4) and induction coil supply units (626, 628; Figure 6) wound around a dielectric pipe (620; Figure 6). Means for providing dissociated monatomic nitrogen atoms in the processing chamber, wherein the monatomic nitrogen atoms are provided in the processing chamber for processing the substrate ("wafer"; throughout) therein – claim 21. Support for this portion of claim 21 is found in section [0061]. Specifically, the specification teaches "In addition, an induction coil 96 is wound around the gas pipe 93, and the high frequency power is applied from a high frequency power supply 97 to the induction coil 96.". Lee teaches an induction coil 628 is wound around the gas pipe 620, and the high frequency power is applied from a high frequency power supply 626 to the induction coil 628. As such, Lee teaches an equivalent apparatus that performs the function of means for providing dissociated

gas (gas identity is intended use). As a result, Fairbairn's prior art elements of 628, 620, and 626 for providing dissociated gas (gas identity is intended use) perform the identical function of providing dissociated gas (gas identity is intended use) in substantially the same way, and produces substantially the same results as the corresponding elements disclosed in the specification (MPEP 2183).

Sukuki is discussed above.

Rhieu teaches a UV photo-assisted CVD apparatus (column 3; lines 25-36; Figure 1) including a controller (48; Figure 1) controlling UV lamps (9/32; Figure 1,1A).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for Fairbairn to use alternate and equivalent means for plasma generation as taught by Lee, and to add Rhieu's UV controller to Fairbairn's "system controller" (column 20; lines 45-67).

Motivation for Fairbairn to use alternate and equivalent means for plasma generation is taught by Lee (column 22, line 58 – column 25, line 50).

Motivation to add Rhieu's UV controller to Fairbairn's "system controller" (column 20; lines 45-67) is to provide optimum uniformity of the deposition as taught by Rhieu (column 3; lines 53-60).

Response to Arguments

4. Applicant's arguments with respect to claims 1-6, 8-10, 19, and 21-24 have been considered but are moot in view of the new grounds of rejection.

5. Applicant's arguments are centered on the specific amendments to the claims. In response, the Examiner addressed each and every claim amendment in the body of his rejections provided above. For example, Applicant states:

“

Independent Claim 2 recites a processing apparatus that includes a monatomic nitrogen atom supply unit for providing dissociated monatomic nitrogen atoms in a processing chamber. Amended Claim 2 recites that the monatomic nitrogen atoms are provided in the processing chamber after finishing processing the substrate therein to remove charge on the electrostatic chuck provided in the processing chamber and that the monatomic nitrogen atoms are dissociated before entering the processing chamber. The monatomic nitrogen atom supply unit includes a pipe communicating with the processing chamber through a sidewall of the processing chamber. Amended Claim 2 further recites that a height at which the pipe communicates with the processing chamber is substantially equal to a height of the electrostatic chuck provided in the processing chamber

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In response, the Examiner’s new grounds of rejection clearly cite in the prior art where such new claim reqiurements are met. For example, Fairbairn was cited as meeting the amended claim requirement of the monotomic nitrogen atoms are dissociated before (“flow rate of *activated* species”; column 19; lines 11-20) entering said each processing chamber (process regions/chambers 618,620 in common 106; Figure 4, 19, and 24; - see common “106”; column 4, lines 35-55). See above.

Applicant further states:

“

However, Fairbairn does not describe a monatomic nitrogen atom supply unit that includes a pipe communicating with a processing chamber through a sidewall of the processing chamber, an N2 gas supply source for supplying an N2 gas through the pipe, and an energy supply unit for applying energy to the N2 gas in the pipe to convert the N2 gas into dissociated monatomic nitrogen atoms. As can be seen in Figure 24, the conduit 811 communicates with the upper portion of the processing chamber 106.

"

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Applicant further states:

"

Lee fails to cure the deficiencies in Fairbairn. Figure 6 of Le___~e illustrates a transport polymerization system 600 employing RF to generate a plasma.3 Precursors are stored in a precursor holder 604, are transported via a pipe 608 and through a liquid injector for liquid precursors, or a mass flow controller 612 for gases, then are transported via another pipe 616 into a plasma tube 620.4 Precursors are exposed to RF energy generated by a RF generator 626, through a coil 628, and a plasma 630 is thereby generated.5 The plasma 630 then flows into a deposition chamber 634 which is surrounded by a heater 638.6 However, as can be in Figure 6, the plasma tube 620 is connected to a top wall of the deposition chamber 634. Accordingly, Lee does not suggest that monatomic nitrogen atoms are supplied from a sidewall of the chamber.

“

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Specifically, Suzuki is cited as teaching a plasma processing apparatus (figures 1,2) including process gas piping (34A-C; Figure 1,2) injected through a sidewall (4; Figure 1,2) of each of said processing chamber (4; Figure 1,2).

Applicant further states:

“

Further, none of the cited references suggest that a pipe that communicates with the processing chamber to deliver dissociated atoms is substantially equal to a height of the electrostatic chuck provided in the processing chamber. As noted above, the Fairbairn describes a conduit 811 that communicates with an upper portion of the processing chamber 106, and Lee describes a plasma tube 620 that is connected to a top wall of the deposition chamber 634. Moreover, as discussed above, the nozzle means 34 do not supply monatomic nitrogen atoms are dissociated before entering the processing chamber. However, even if the nozzle means 34 are identified as the claimed pipe, as can be seen in Figure 2 of Suzuki, the nozzle means 34 are not substantially equal to a height of the electrostatic chuck provided in the processing chamber

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In response, as noted in the Examiner's above rejections, Fairbairn's vertically *movable* chuck renders the associated claim limitation an intended use claim limitation. Because Fairbairn's

chuck is vertically *movable* then the Fairbairn apparatus is capable of meeting the intended use. When the structure recited in the reference is substantially identical to that of the claims, claimed properties or functions are presumed to be inherent (In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977); MPEP 2112.01).

The remaining arguments (pp.16-18) are based on newly added claims 22-24. In response, the Examiner notes that each of the added claims are Examined and the proposed new grounds of rejections are provided in view of the newly applied reference to Rhiue; Ji H. (US 5364667 A).

Conclusion

6. Applicant's amendment necessitated the new grounds of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Rudy Zervigon whose telephone number is (571) 272-

1442. The examiner can normally be reached on a Monday through Thursday schedule from 8am through 7pm. The official fax phone number for the 1792 art unit is (571) 273-8300. Any Inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Chemical and Materials Engineering art unit receptionist at (571) 272-1700. If the examiner can not be reached please contact the examiner's supervisor, Parviz Hassanzadeh, at (571) 272-1435.

/Rudy Zervigon/

Primary Examiner, Art Unit 1792